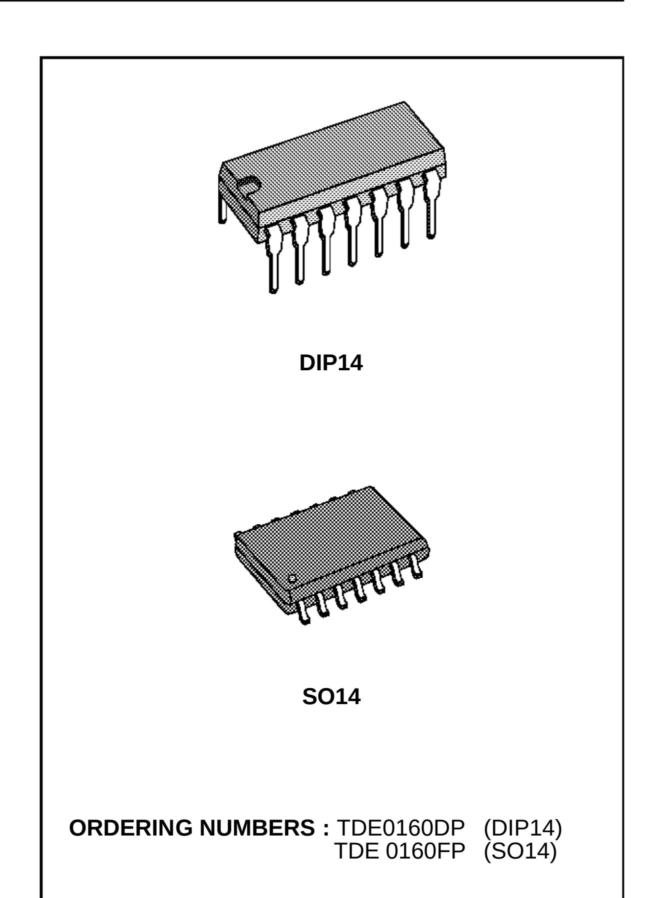


TDE0160

PROXIMITY DETECTOR

- SUPPLY VOLTAGE : +4 TO +36V
- SUPPLY CURRENT : < 1.2mA
- OUTPUT TRANSISTORS : I = 20mA ; $V_{CE\ (sat)} \leq 1100mV$
- OSCILLATOR FREQUENCY : < 1MHz
- LOSS RESISTANCE : 5 TO 50kΩ.

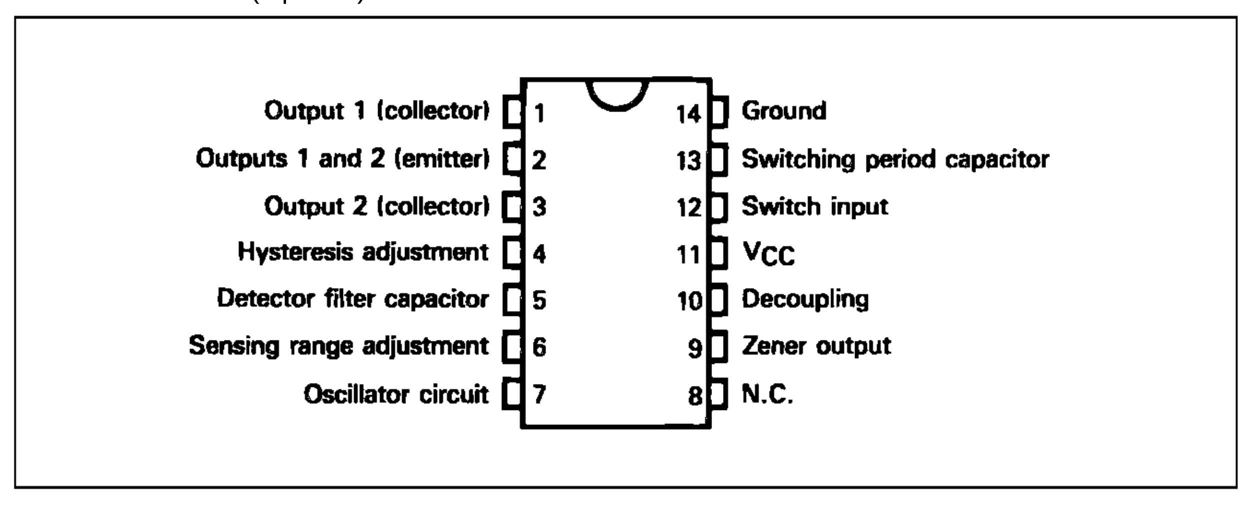


DESCRIPTION

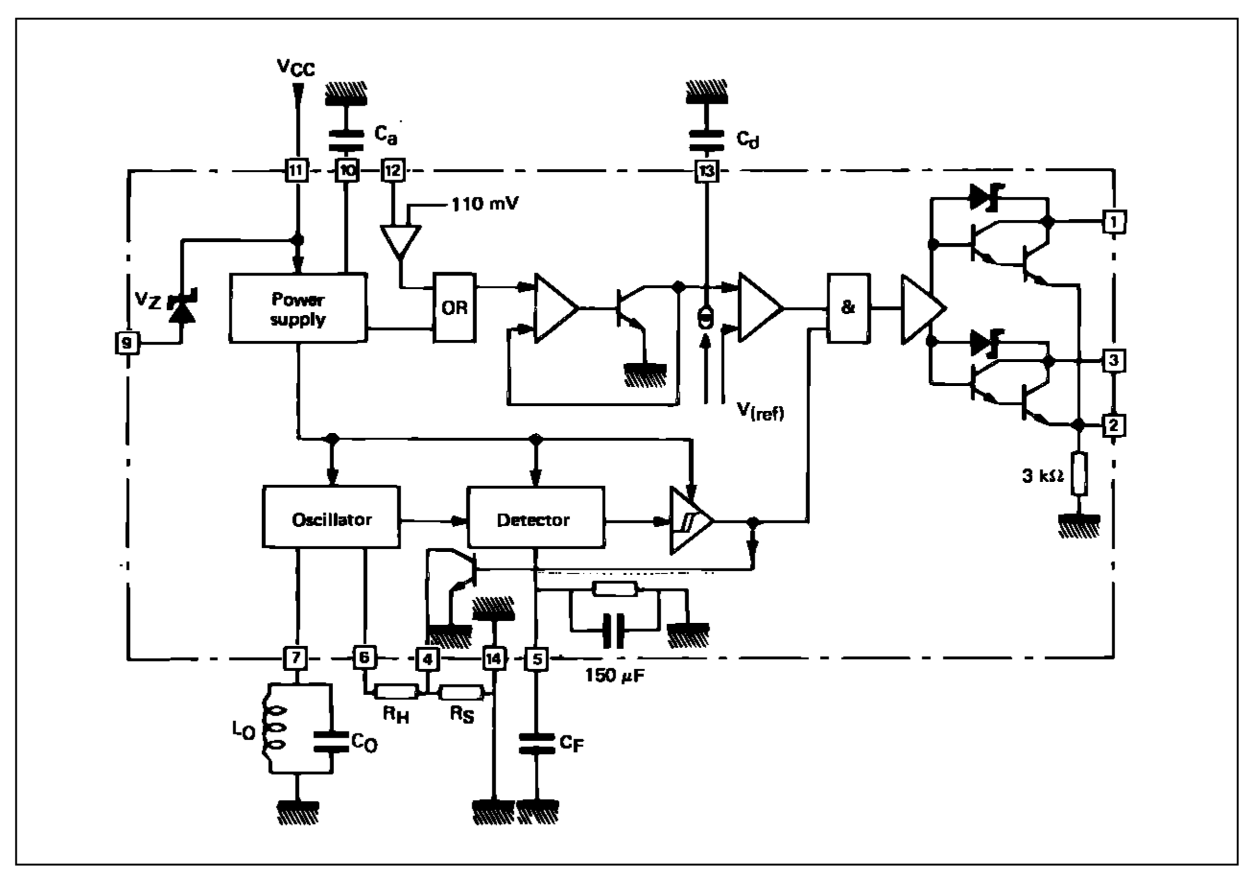
The TDE0160 is designed to detect metal bodies by the effect of Eddy currents on the HF losses of a coil. It has two complementary open collector outputs with peak limiting. Hysteresis is adjustable, and an electronic switching circuit is incorporated for disabling both outputs.

An internal zener diode maintains the supply voltage to the circuit in "dipole" operation.

PIN CONNECTION (top view)



SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	36	V
V_{O^*}	Output Voltage*	36	V
I_O (I_1-I_3)	Output Current (I_1-I_3)	40	mA
I_Z	Zener Current	40	mA
T_j	Junction Temperature	+ 150	°C
T_{oper}	Ambient Temperature Range	– 25 to + 85	°C
T_{stg}	Storage Temperature Range	– 65 to + 150	°C

* Internal peak limiting to protect against transient voltage surges.

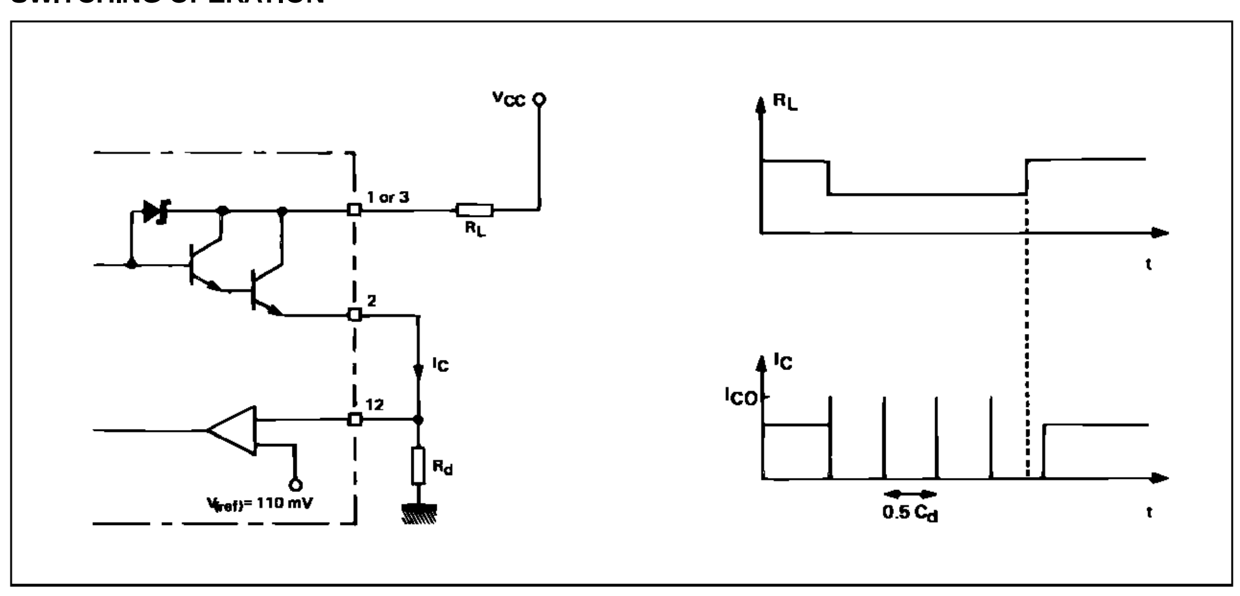
ELECTRICAL CHARACTERISTICS

T_{amb} = +25°C unless otherwise specified

Symbol	Parameter		Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage	Pin 11	4		36	V
V_Z	Zener Voltage (I_Z = 20mA)	Pins 9-11	3		4	V
I_{CC}	Supply Current	Pin 11			1.2	mA
–	Limiting (I = 0.1mA)	Pin 1 or 3		42		V
–	Output Transistor Saturation Voltage (I_1 or I_3 = +20mA)	Pin 1 or 3		0.9	1.1	V
–	Output Transistor Leakage Current (V = +30V)	Pin 1 or 3			2	µA
–	Switching Threshold	Pin 12	90	110	130	mV
R_n	Negative Resistance* (5kΩ < R_H < 50kΩ, f = 100kHz, R_S = 0)			$R_n = R_H$		
–	Inherent Hysteresis (R_2 = 0)			1	2	%
–	Programmed Hysteresis (H < 15%)			$\frac{R_s}{R_s + R_H}$		%
f_{osc}	Oscillation Frequency				1	MHz
–	Switching Frequency (with matched oscillator circuit)			750		Hz
–	Switching Time-delay			0.5 C_d (µF)		s
–	Switching Response Time (C_d = 10nF ; V_{CC} = +20V)			10		µs

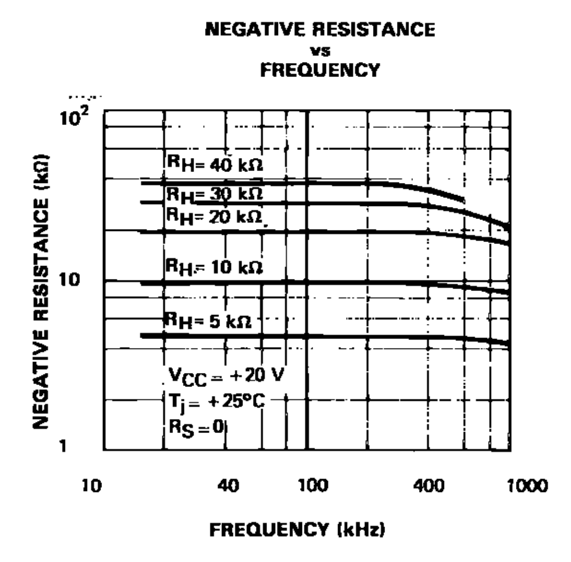
* See characteristic curves

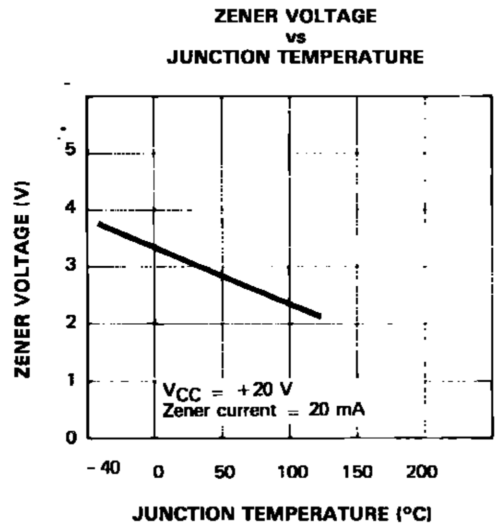
SWITCHING OPERATION

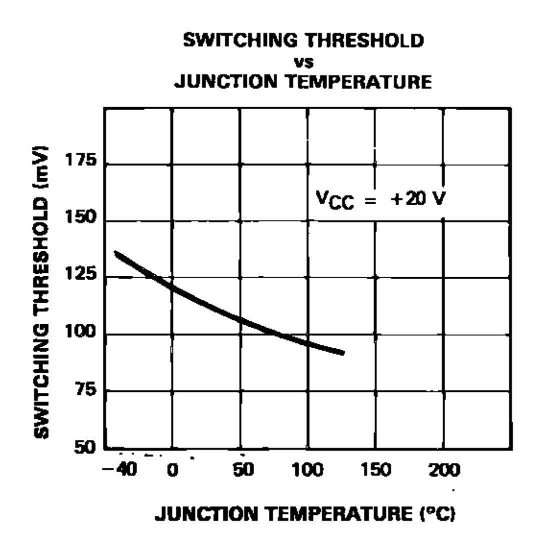


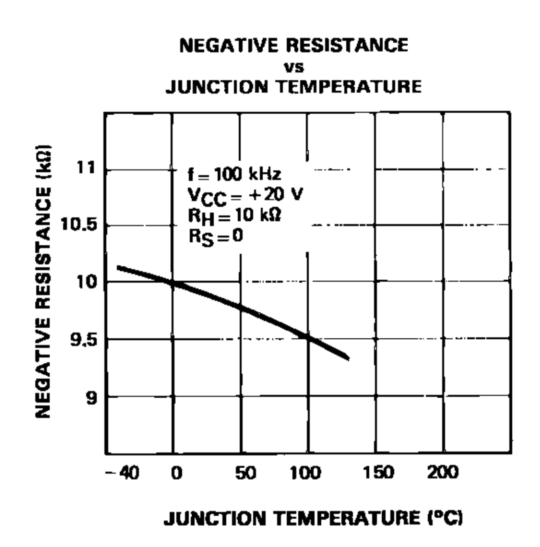
If I_C exceeds I_{CO}, where $I_{CO} = \frac{V_{(ref)}}{R_d}$ the switch cuts off the output transistors and tests the value of current I_C, with time constant 0.5 C_d.

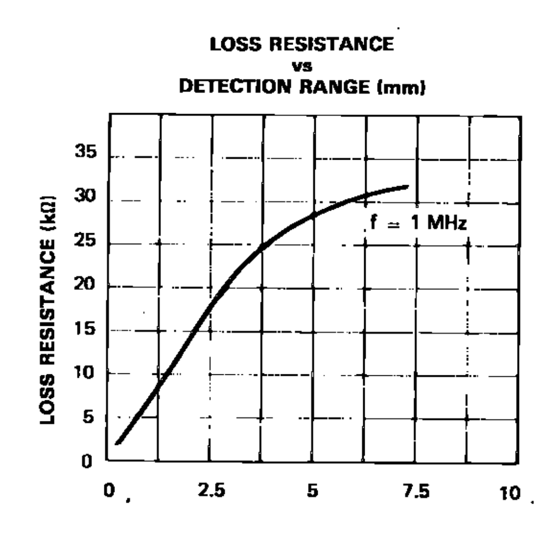
On power up the internal start system cuts off the output transistors until V_{CC} reaches a value permitting normal operation of the circuit.


NEGATIVE RESISTANCE
vs
FREQUENCY
NEGATIVE RESISTANCE (kΩ)
RH= 40 kΩ
RH= 30 kΩ
RH= 20 kΩ
RH= 10 kΩ
RH= 5 kΩ
VCC = +20 V
Tj = +25°C
RS = 0
FREQUENCY (kHz)

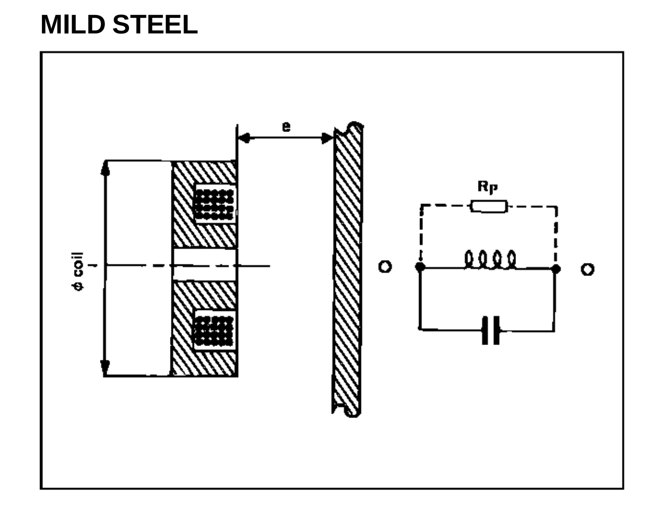

ZENER VOLTAGE
vs
JUNCTION TEMPERATURE
ZENER VOLTAGE (V)
VCC = +20 V
Zener current = 20 mA
JUNCTION TEMPERATURE (°C)


SWITCHING THRESHOLD
vs
JUNCTION TEMPERATURE
SWITCHING THRESHOLD (mV)
VCC = +20 V
JUNCTION TEMPERATURE (°C)

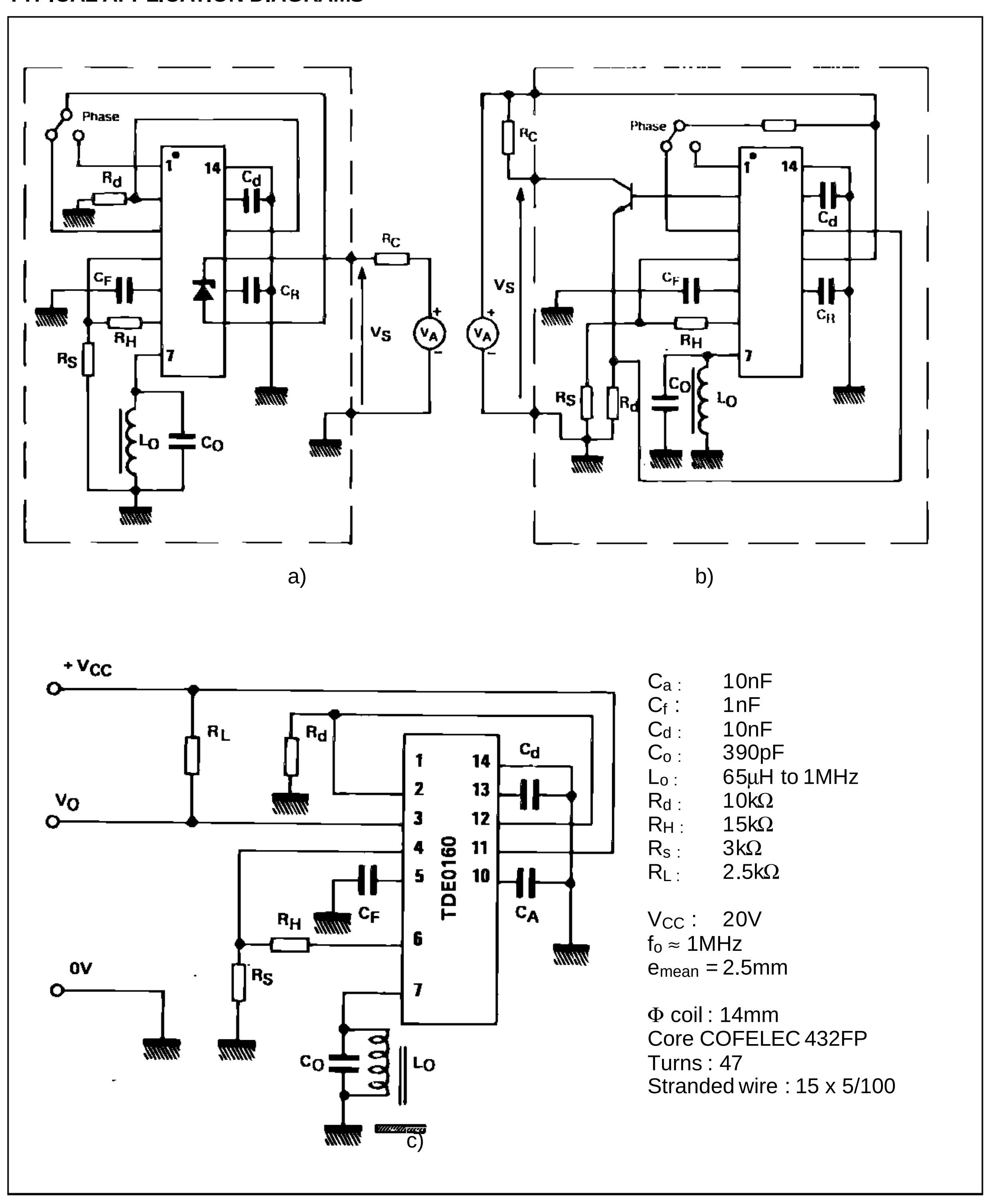

NEGATIVE RESISTANCE
vs
JUNCTION TEMPERATURE
NEGATIVE RESISTANCE (kΩ)
f = 100 kHz
VCC = +20 V
RH = 10 kΩ
RS = 0
JUNCTION TEMPERATURE (°C)


LOSS RESISTANCE
vs
DETECTION RANGE (mm)
LOSS RESISTANCE (kΩ)
f = 1 MHz

MILD STEEL

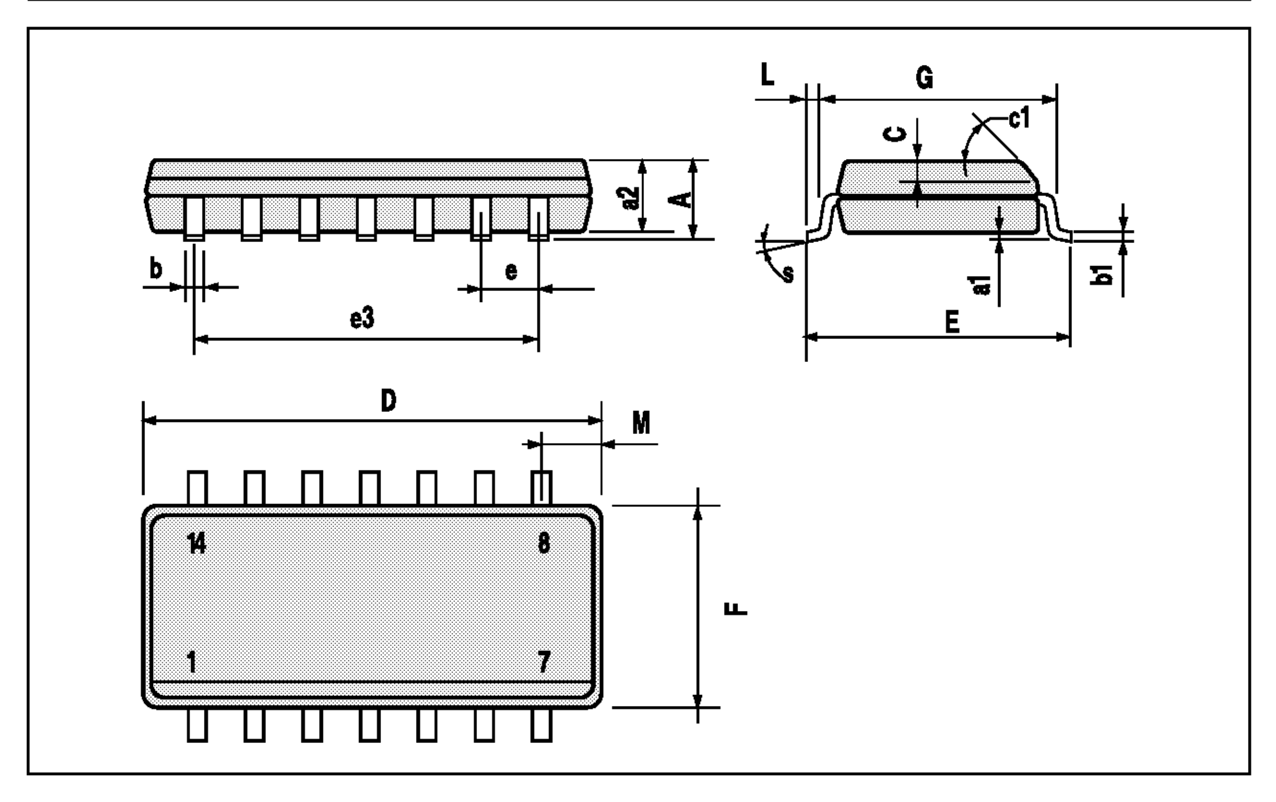

e
ϕ coil
Rp

TYPICAL APPLICATION DIAGRAMS



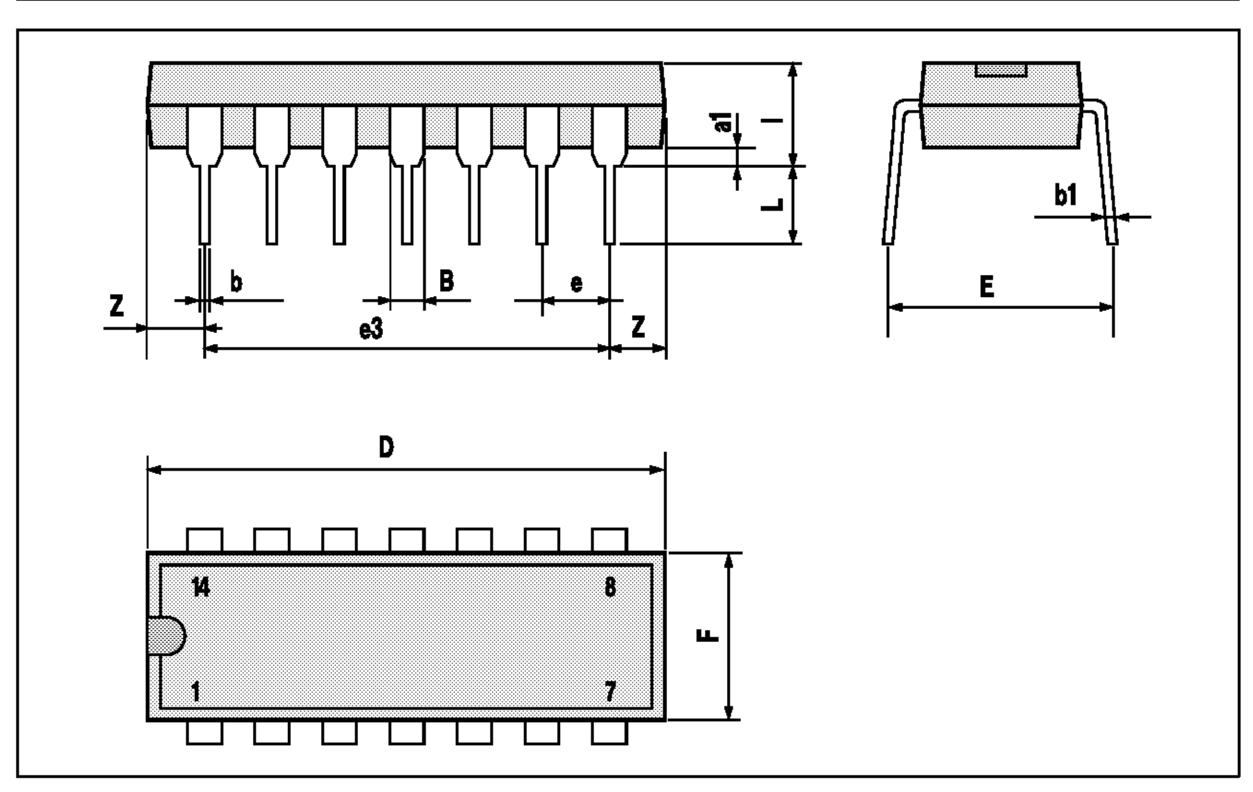
SO14 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.069
a1	0.1		0.25	0.004		0.009
a2			1.6			0.063
b	0.35		0.46	0.014		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.020	
c1	45 (typ.)					
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
M			0.68			0.027
S	8 (max.)					



DIP14 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100




SGS-THOMSON
MICROELECTRONICS